DOCUMENT RESUME

ED 304 102 IR 013 660

AUTHOR Rice, Michael
TITLE Probing the Potential of Electronic Publishing and Computer Software for Personal Use. Report of an Aspen Institute Conference (Queenstown, Maryland, January 12-14, 1988). Communications and Society Forum Report #6.
INSTITUTION Aspen Inst. for Humanistic Studies, New York, N.Y.
SPONS AGENCY John and Mary R. Markle Foundation, New York, N.Y.
PUB DATE 88
NOTE 28p.
PUB TYPE Collected Works - Conference Proceedings (021) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Software; *Consumer Economics; *Electronic Publishing; Innovation; *Marketing; *Publishing Industry; *Technological Advancement; Videotex
IDENTIFIERS *Interactive Television

ABSTRACT

This report summarizes the presentations and discussions at a conference on the development of new products and services in electronic publishing and computer software for personal use. It is noted that the 26 participants came from a variety of perspectives, including the publishing and computer software industries; the fields of home entertainment, education, social services, information, and new media; and the users, creators, and critics of electronic information services and products. Building on two previous conferences, this meeting was designed to specify new instances where it might be possible to match up three basic elements in the creation and promotion of a new product: (1) a significant consumer need or interest; (2) the distinctive capabilities of a particular electronic technology; and (3) the editorial content or creative experience which that technology might offer to users. Three discussions were held based on presented papers on technical invention and social innovation, the development of a consumer-oriented home information and transaction system, and computer technology in the home. In addition, one roundtable discussion was devoted to reviewing the various electronic-information products, prototypes, or services that were demonstrated on site. Finally, one discussion centered around the presentation of a prototype product, personalized television. A list of conference participants is included. (EW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED304102

Communications and Society
FORUM REPORT

Aspen Institute
One Lincoln Plaza
New York, NY 10023
(212) 724-4242

Michael Rice
Program Director

PROBING THE POTENTIAL OF ELECTRONIC PUBLISHING AND COMPUTER SOFTWARE FOR PERSONAL USE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Report of an Aspen Institute Conference
Wye Woods Conference Center
Queenstown, Maryland
January 12-14, 1988

by
Michael Rice
Moderator

*This is **FORUM REPORT** #6 in a series intended to invite wider interest in the concerns and activities of the Aspen Institute Project on Enhancing the Social Benefits of New Electronic Technologies, supported by a grant from the John and Mary R. Markle Foundation.*

© 1988 Aspen Institute for Humanistic Studies

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Stephanie Ralston
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

IR013660

David T. McLaughlin, Chairman
Colin W. Williams, President

Aspen Institute for Humanistic Studies

An independent, international, nonprofit organization, the Aspen Institute brings together leading citizens to discuss issues of lasting significance. Its Program on Communications and Society serves as an impartial forum for assessing the importance of modern communications and information systems to the ideals and practices of democratic society.

PROBING THE POTENTIAL OF ELECTRONIC PUBLISHING AND COMPUTER SOFTWARE FOR PERSONAL USE

Conference reports are always an awkward form of journalism, often as taxing to read as to write. This one—on a conference given the workmanlike title, "Issues and Case-Studies in Electronic Publishing and Computer Software for Personal Use," and held January 12-14, 1988, at the Aspen Institute's Wye Woods Conference Center on the Eastern Shore of Maryland—poses an even greater challenge than usual because the participants spent only half their time in the sort of roundtable discussion that lends itself to summarizing. The rest they devoted to hands-on demonstrations and trials of a wide variety of electronic-publishing products and services. Since no written account, alas, can convey the high excitement and frequent surprise that marked the latter aspect, this report will have to adhere mostly to the formal discussion portions of the event.

There were twenty-six participants, all specially invited to represent a diversity of perspectives: the publishing and software industries; the fields of home entertainment, education, social services, information sciences, and news media; and the users, creators, and critics of electronic information services and products.

The conference was another in a series held by the Aspen Institute's Project for Enhancing the Social Benefits of New Electronic Technologies, supported by the Markle Foundation. Its agenda and format grew out of two previous meetings (each already the subject of a Communications and Society FORUM REPORT, copies of which are available on request):

— The first, held in February 1987, opened our inquiry into how various forms of electronic publishing might be further developed to serve important consumer needs and social interests that have yet to become a focus for this new industry in the United States.

— The second, in June 1987, began defining what it might take to encourage further improvements and innovations in computer-software products intended for educational and entertaining uses in the home.

On both occasions, the participants debated the conditions necessary to make a new service or product a success. This sequel conference was to carry that debate forward. Again, the aim was to specify new instances where it might be possible to match up three basic elements: (a) a significant consumer need or interest, (b) the distinctive capabilities of a particular electronic technology, and (c) the editorial content or creative experience which that technology might offer to its users.

Three papers were commissioned to serve as a basis for discussion (these, too, are available on request at no cost: see attached order form). In addition, to expand the first-hand knowledge that the participants might share and compare, there were on-site opportunities to experiment with bellwether examples of on-line data-base publishing, stand-alone forms of electronically-stored information (e.g., CD/ROM), interactive video, and personal-computer software for home entertainment and education.

To keep the conference within manageable bounds, we confined our scope to products and services designed (or proposed) *for personal use*, implying use in the home or in other settings under the control of an individual consumer or family. We ruled out institutionally-organized uses of the sort found in business firms, schools, and libraries, except when those arenas were a source of models for this narrower category.

The Markle Foundation looks to this conference series to identify new possibilities for research or development that it might support in the work of other organizations. The meeting, therefore, was a chance for participants not just to learn from each other, but also to influence future grantmaking in the field.

TECHNICAL INVENTION AND SOCIAL INNOVATION

The first discussion session centered on issues raised in a paper prepared by Richard Adler of the Institute for the Future, "Technologies for Electronic Publishing and Computer Software: An Essay on Technical Invention and Social Innovation."

In that paper, Adler distinguished *technical invention*, which "determines what types of applications are possible," from *social innovation*, which "determines how a technology will actually be used." The first uses of radio, for example, were not for the mass medium we know today. "More than two decades elapsed between Marconi's invention of radio transmission and the social invention of the medium of broadcasting. Moreover, it was not the technologists or the business planners who figured out how to use the technology for broadcasting, but rather a group of enthusiastic amateurs who led the way in identifying how the technology could be used by individuals."

"Much the same pattern," Adler went on, "was repeated some seven decades later with the development of the personal computer. Beginning in the middle 1970s, thanks to the development of the transistor, it became technically feasible to build a computer small enough and inexpensive enough to be used by a single person. But why would one person want his own computer? A group of researchers at Xerox's Palo Alto Research Center had in fact built such a machine to experiment with—but they could not convince their employer that there would be enough of a market to justify turning it into a product. A

few miles away at about the same time, an engineer at Hewlett-Packard named Steve Wozniak was having equally little luck persuading his employer to pursue development of a personal computer. So Wozniak, along with his friend, Steve Jobs, built and sold a primitive personal computer on his own time. This tiny venture, of course, was the origin of Apple Computer."

"The real issue," Adler emphasized, "is not the sheer capability of a technology, but its application—how to put it all together in a way people will care about." Adler underscored this theme in reviewing, on the one hand, technology trends in hardware, software, and networks—and, on the other hand, six applications in different stages of development: optical storage media (in various forms of compact disc and videodisc); hypertext (especially, Apple's HyperCard software); videotex; computer networks; the smart card (incorporating "the essential elements of a personal computer—memory, a microprocessor, and some form of input/output interface—on a piece of plastic precisely the size of a standard credit card"); and a concept ("the Dynabook") for a portable electronic encyclopedia of the future.

A common feature of all these applications, Adler pointed out, is the way they invite ordinary users to create their own configurations of information, as suited to their personal needs or even their own publishing ambitions.

"That's a double-edged sword," commented Jeffrey Sarnoff of Carmara & Associates. "All these capabilities may foster a lot of mediocrity. We may see things that work, but aren't all that great. Up till now the economics of technology development have forced a high degree of excellence into the results. Now we can't count on that."

"Having to compromise to achieve mass-market use isn't necessarily a blow against excellence," protested Ted Voss, a consultant to manufacturers of technology-based consumer products.

"I'm all for more people being able to tackle new technology," replied Sarnoff, "but what that means for society will be different from what it has been while technology was entirely in the hands of highly-disciplined professionals."

At this, Glen Hoptman of the Smithsonian's National Demonstration Laboratory took umbrage, citing as "the enemy those who would do anything to keep the great many people from getting into the act."

"Enthusiastic amateurs," commented Mark Heyer, an interactive-video producer, "are essential to the takeoff of these technologies—as we've already seen with videocassette recorders, personal computers, and electronic music synthesizers."

"The key word for consumers," Voss said, "is *control*. Whatever it is, they want to be in control of it. They dislike *being* controlled."

John Harvey, an inventor, harked back to Adler's history of radio's development. The lesson, he said, was not just that it took twenty years before someone saw that a system for point-to-point communications could also be used as a broadcast medium. Even more significant were the subsequent breakthroughs in its organization as a business, namely, that the big fortune to be made was not in the sale of radio receivers to listeners, but in the sale of radio airtime to advertisers; and that program syndication, or networking, could aggregate the market for advertising on a nationwide scale. The issue of a successful technology application, Harvey concluded, "therefore comes down to how the commercial interests make their money."

Gary Arlen, publisher of the newsletter, *Interactivity Report*, suggested that the crucial agents in fostering new applications were often the intermediaries between the hardware manufacturers and the consumers: banks, credit-card companies, insurers, and the like.

Cautioned Walter Baer, Times-Mirror's Director of Advanced Technology: "We haven't yet reached a mass audience with any of the new technologies [that Adler described]. For any of them, household penetration is ten percent at most now—or won't reach even that level for ten years or more. These things are for the consumer elites, the innovators, the early adopters."

Taking issue with that, Harvey Poppel, a partner in a firm that deals with mergers and acquisitions in the communications industry, declared, "Lots of people are being influenced by these technologies but not always in their homes. Fully twenty-five percent of bank customers now use automatic teller machines. Everyone is now familiar with the bar scanners in supermarkets used to speed up the checkout lines. We shouldn't look only at devices in the home. There are many, many electronic networks now involving us all. It's much more egalitarian and multi-nodal than you might first suspect."

Robert Lippincott, Market Development Director for Lotus, the software company, felt it useful to distinguish between two cases: the one where producers reach out to consumers (when, for example, a Procter & Gamble uses the data gathered from supermarket bar scanners to customize its new product offerings), and the other where new technology-using lifestyles for play, work, reading, or exchange are created and controlled at the grass roots.

The first case, observed Steve Gano, a software product designer, requires a large installed system base, while the second can grow out of widely dispersed users of stand-alone technology.

Lippincott thought that Apple's HyperCard software would promote the second, grass-roots brand of progress. HyperCard permits personal computer users not versed in the technical aspects of programming to assemble their own "stacks" of texts and images and to design their own cues and paths for gaining access to them. "And the good thing about it," Lippincott added, "is that it comes free—it's 'standard equipment'—with the Macintosh."

"It's comparable with the first appearance of automatic transmissions on automobiles," agreed Baer, "which brought into driving a whole new class of drivers. HyperCard will do the same for the authoring of interactive information banks."

Poppel added, picking up on the automobile analogy, "Road maps were another such innovation."

"When you buy a car, that's all the hardware you need to take to the road," warned Antonia Stone, director of Playing to Win, Inc., an agency that attracts youngsters to the uses of computers. "But with a personal computer, you have to buy a lot more to go with it in order to make any use of it, and it takes a lot more time and trouble to learn how to operate it than it does to drive a car."

"I look forward to the day," said Carl Oppedahl, a lawyer and technology buff, "when for our computers, just as for our cars, we'll always know where all the basic controls are and how to use them—for example, how to print out a document."

"That won't happen," Voss commented, "until hardware people start marketing to home consumers, not just to the business niches they're going for now. The virtue of 'saving time' is crucial to making a computer product a success in the mass market. It's important to keep reminding the designers: 'Don't tell us what *you* would do with it, but what *we* would do with it, especially how we could use it to save time.' Otherwise, we'll just keep hearing the same ol' hit parade of supposed uses for a home computer that have never materialized."

Paul Bishop, Director of Computing at Washington College, supported the view that enthusiasts are important to new technology applications. "So what," he asked, "are they getting excited about *now*?" Answering his own question, he pointed to his students' attraction to communicating and retrieving information via computer networks, especially on the so-called "chat" programs, where a user can tap into an ongoing multi-party, electronic-text conversation on a subject of shared interest. "Type-talking on a screen breaks down lots of social barriers," he added.

"But how," asked Sarnoff, "can you give people access to all these information sources without overwhelming them—without enmeshing them in all sorts of filters that are too discouraging to use?"

One model answer, suggested Gerry Barker, is Startext, the electronic news and information service he manages for the Fort Worth Star-Telegram in Texas. "With Startext, we've given a tool to people with personal computers and modems. We've let our subscribers help to create the service. Many use it to get in touch with others who share their interests, using the system's electronic-mail feature. Users pay $9.95 a month plus tax for unlimited connect time. New users spend lots of time navigating all over the database, but once they get used to it, their average connect time is 15 minutes. Classified ads are the most popular offering, partly because every ad placed in the newspaper is shown first on Startext a day in advance, giving Startext users a 24-hour headstart over newspaper readers of the same ads."

"Telemarketing and video-shopping services are booming," said Poppel, "and might in time supplant videotex services like Startext. The ability to do transactions *on* the system could make a gangbuster difference."

Frank Fisher, a consultant to Harvard's Perseus Project, which is assembling an electronic database of all the extant writings and important archaeological evidence from classical Greek civilization, proposed re-addressing Adler's original distinction between technical invention and social innovation: "It looks as if we don't have to worry about further progress in microchips; advances on that front continue to gallop ahead. On the other hand, it appears that we all want to ennoble consumers—to give them control over these new resources. So, aren't our issues the ones that fall in between? Issues such as whether we, as a society, are investing enough in research and development on the social-innovation side of the picture? And whether market forces will be sufficient to fuel that investment, or government will have to play a role?"

"We've identified lots of driving forces—convenience, control, entertainment, and so on," replied Adler, "but the problem is we can't yet deliver the presumed benefits in a way that people can use and enjoy as easily as we'd like them to be able to. The technology is still not transparent enough. Tapping into these systems still isn't as simple as, say, making a phone call."

"Quite apart from the difficulties of use," warned Kathleen Wilson of the Bank Street School of Education, "we should also consider the outright *de*-motivating factors. Electronic mail, for instance, looks less appealing when it's used as just another medium for junk mail. And people get worried about privacy invasion when they see how very personal information about their spending habits or other choices can leak out electronically to users—some known to them, others only suspected—who are well beyond their reach."

These last comments tended to underscore the group's perception that, for electronic-publishing and computer-software products to earn widespread acceptance and use among personal consumers, there will have to be new breakthroughs in *both* the process of technical invention and the process of social innovation. If progress thus far has seemed disappointingly slow, it is not simply because most people are tardy at catching up with what the technology can do for them. Computer-based technology itself, in the products and services that presently embody it, still falls short of delivering to a mass market clear advantages in content or ease of use as compared with other, more established information and communications resources.

"GETTING IT ONLINE"

Gary Arlen's lengthy paper, prepared especially for the conference, was entitled, "Getting It Online: Prospects for Developing a Consumer-Oriented Home Information and Transaction System." Citing the extensive and costly attempts to create such systems, Arlen noted that results have been paltry so far. After some $2.5 billion of investment in videotex projects, "barely 1.1 million U.S. homes are now connected to information services." On the other hand, he listed the several lessons that can be taken from the pioneers' failures and offered his own "formula to make consumer videotex succeed." ("Videotex" = any easy-to-use interactive electronic information service delivered to the user's terminal "online," that is, via network connections such as provided by telephone lines.)

Here is Arlen's list of ingredients for "how to make it work":

Content:	A smorgasbord of well-balanced information services.
Applications:	Services that fulfill consumers' needs, not just automate information providers' operations.
Gateway:	An easy way to access and to pay for individual services.
Carriers:	It's 'inevita-BELL.' Bring on the RBOCs [Regional Bell Operating Companies].
Standards:	Make it easy to read and easy to use.
Hardware:	Dumb, cheap terminals. But for those who want a big, smart computer, let them access the services, too.

Smart Homes: The major issue for the next millenium. Information services fit into the new home-area networks of the next generation of homes.

Regulation: Let the RBOCs in.

Hybrids: Explore new territory by encouraging cable TV participation.

Success Story: Nothing would be better for the credibility of the videotex business than a report about a venture that had been profitable to the promoters and useful to the customers.

(If some of those points seem cryptic, use the attached form to order Arlen's complete paper, where he spells out his advice in greater detail.)

Speaking of Times-Mirror's videotex service, now abandoned, Walter Baer said, "Consumers found it too complex, the terminals too complicated, and the cost too high. It never established its value ('Where's the beef?') to residential customers. But videotex services aimed at business and professionals are doing very well. Over time, there will be a progression from the business market to the high-end, early-adopter sort of personal consumer...and then more broadly to others. In France, the message service is a big part of Minitel's success. Sending and receiving electronic messages among subscribers also proved most popular in the Times-Mirror system, but we couldn't capture any revenues from that! I believe it will be important for any future videotex service to offer a basic set of services at a fixed charge, with extra charges imposed only for specific premium offerings."

Agreeing, Gerry Barker cited Startext's current experience with its 3,000 subscribers in Fort Worth: "$9.95/month for the basic service is a magic price point."

Jeffrey Sarnoff recalled that, when for a time he was offered free access to CompuServe, he "could easily spend three hours on the system every other evening," but later when he had to pay for it, he decided "it wasn't worth it."

Harvey Poppel remarked that he saw "no proof that ordinary people, as opposed to 'techies,' want to communicate via electronic bulletin boards or chat services. Even in the business market, the new trend is toward facsimile transmission, not screen-to-screen electronic mail."

Ted Voss wondered, "Why can't this be an *advertiser*-supported medium? As long as it's confined to personal-computer owners, its audience reach will be very limited. Couldn't a simpler terminal permit it to expand to a much broader market?"

Why, if the purpose of this inquiry is to address the potential *social* benefits of these new technologies, was the group so preoccupied with the criteria of *commercial* success?

"The prospects for social benefit will differ greatly, depending on which development scenario you have in mind," commented Richard Adler. "If we assume a mass-market impact, as we have seen with television or the telephone, that suggests gains (or problems) on a vast scale...and tempts one to keep looking for the Rosetta stone that will reveal how to achieve it. But perhaps there is *no* mass market to be found, but instead a whole series of vertical markets, each exploited by a separate service—such as QuantumLink [an online, interactive videogame venture directed specifically to owners of Commodore home computers]. In that case, you don't have to wait for the technology to gain wide penetration in the consumer market before you consider or promote social applications." Instead, Adler implied, each of the social applications will occupy its own niche, just as the frankly commercial services will.

Detecting an unsavory touch of elitism in this reasoning, Bernard Luskin, President of American Interactive Media, asked, ironically, "Do we have to give people what they want before we can get them to do what we want?"

James McGowan of CTL Communications, a company planning to introduce Minitel service in the United States, said, "The niche-market approach is all right for personal-computer owners who are already out there, but a mass-market approach will crucially depend on a standardized, easy-to-use terminal."

"We shouldn't be talking about delivering a mass market," said Voss, "but instead a system—like radio or television—that can exist *in* the mass market offering many different options."

"Why do we care?" asked Rob Lippincott. "What do we want to accomplish? Is our aim to empower people with computer tools, as a product like HyperCard, for example, purports to do? Or, is it to educate? Or what?"

"With Startext," replied Barker, "we're seeing that people are finding all sorts of uses for themselves. In the beginning, we wanted to remove the price barrier, so we said that for $9.95 a month, you can use it all you like [an offer enhanced, Barker admitted, by the fact that telephone subscribers in the Fort Worth area enjoy *unlimited* local calling at a flat rate; if they had local *measured* telephone service, they could face a significant boost in the total cost to them of connecting with Startext for long periods]. That fixed charge gives our users the freedom to discover or devise the system's value to them. A quadriplegic told us, for instance, 'For the first time in my life I can read a newspaper.' Yet it had never occurred to us that we were creating a service of special benefit to the handicapped."

"Sure," said Luskin, "you can wait for individuals to discover their own uses, but if you want to address broadly existing problems, then you have to go to broadly applicable solutions. You have to be more systematic if you want, say, to encourage children's curiosity and their active pursuit of knowledge."

"I can remember," said Lloyd Morrisett, President of the Markle Foundation, "when my parents first got a radio. The programming was lousy; it was hard to tune; it was easy to dismiss its possible importance. Now ninety percent of radio is just music and news, and it's *too late* to do anything to try to enrich it. That makes me ask: Is there anything we can do *now* to make videotex and these other new media that are still in their infancy more socially beneficial in the future, even if it takes twenty-five years? If we don't think about that, will we find ourselves wishing, just as with radio, that we had taken action back when there was still a chance to make a difference?"

Morrisett's admonition to take the long view inspired Carl Oppedahl to spring a straw poll on the group. "How many of you," he asked, "believe that in time there will be something like a Minitel terminal and service in just about every household in America?" Almost every participant put up a hand.

"You can't be sure that the first use of a new technology," said Mark Heyer, an interactive-video producer, "will be the basis of its broader success. The first people to buy videocassette recorders seemed most interested in a medium for pornography in the privacy of their own homes. But now the millions of VCRs in American homes are used mostly for time-shifting broadcast programs and watching movies, either rented or purchased; and video pornography constitutes only a marginal share of the business."

"Instead of trying to *predict* how these new technologies will be used," Paul Bishop asserted, "we should be focusing on what we *want*—and on what other people want—them to do for us. Let's not just guess; let's try to prescribe."

"There are many applications we can imagine," Arlen replied, "from personal health monitoring to electronic home shopping. . . ."

"All those answers are right," Luskin stated. "Mass markets are themselves made up of many niches, but in this case the key requirement for widespread use is ubiquity of the same technology."

"I assume," said Antonia Stone, "that a lot of what are now separate technologies will be amalgamated, including a component for connecting with other people, a component for obtaining facts and figures, a component for receiving pictures, and so on. Many consumers may remain reluctant to buy and adopt until all these components can be had in a single package."

"In responding to Carl's question," Ted Voss suggested, "we showed that we believe that all the technical and price barriers to wide acceptance will eventually be overcome. But that still leaves us with the issue of just what it is of value that these systems will deliver to us."

Rob Lippincott argued, "Even before we can be sure just how it will be used, we have to get the facility out there where people can get at it—just as we did, several generations ago, with the public library system. Let's make the full menagerie of options available. In the process we shall very likely re-invent the meaning of 'community.'"

Jay Iselin, former President of WNET/New York (who was named, subsequent to the conference, head of Cooper Union), asserted, "The public doesn't give a damn about technology itself, but people do care about converting information into useful knowledge. Too many of us are so enamored with machines we end up talking like engineers, not communicators. I believe there *is* a fraction of the populace who are interested in intellectual questions—who would respond to something like an electronic *New York Times*. But ours is a society that depends on the marketplace, not a dedicated tax, to respond to the promise. So, it's time for an idea-driven, not a technology-driven, publishing venture that would make use of these new media."

"Don't cast us in the role of 'noble suppliers,'" cautioned Lippincott. "Remember, this technology permits building networks from the receiver's—or user's—end, not just the publisher's."

"One reason *not* to promote a Minitel approach in the United States," said Richard Adler, "is the fixed-in technical limitations of such a simple, standardized terminal. Let the marketplace sort out the hardware options while we conconcentrate on user interests and applications."

"Still," said McGowan, "the French experience offers important lessons for success: With Minitel you had a government that induced all the necessary but disparate industries to work together—the information providers, the phone companies, and the hardware manufacturers."

"We're agreed," observed Frank Fisher, "on the values of access to knowledge, user control, interaction, etc., but those don't necessarily force us to conclude that the only electronic information system to serve those values must involve two-way, live communication. They do force us to admit, however, the need for digitizing all information in the future, so that it can be made available and used in many different ways. Envision, for example, over-the-air broadcasting of a vast store of data, continually recycled, so that with the appropriate device we can just grab what we want—*Twelfth Night*, say—as it goes by."

"There's another key value to be served," said Harvey Poppel, recalling Ted Voss' earlier point. "People's discretionary time has shrunk considerably over the last twenty years. The reason why commercial developments of these technologies are so crucial is that they're aimed at saving time. If you can save time for a broad range of consumers, you are well on the way to achieving 'social innovation' of the first order."

PERSONALIZED TELEVISION

John Harvey, a partner in the firm of "communications developers" called Harvey, Keil & Parker, presented his firm's patented technology, "personalized television." He said that the inspiration of this new communications medium had been the need "to communicate dynamic insights into the workings of our economy and financial markets"—a need that he felt conventional media could not fulfill.

"Personalized television," he explained, "is a smart medium that is broadcast to smart receivers. It combines television and computers. You can think of the receiver system as a 'smart' TV set. It contains data about its viewer—for example, his portfolio of stocks, the size and health of his family, his dietary preferences, and his tax bracket. At its TV tuner, the set receives a TV signal and inputs the audio and video to its computer, which has the capacity to modify the received audio and video with audio and video overlays that it generates. Embedded (like teletext) in the vertical blanking interval of the TV signal are operating instructions that control the computer. The set detects these instructions at a decoder and inputs them to its computer, causing it to process the data of its viewer and tailor the audio and video to reflect its viewer's individual circumstances. At its printer, it can also produce a personalized print output."

Illustrating how this might work, Harvey cited hypothetical adaptations of several existing weekly or daily television programs. A financial-news program, for example, besides reporting in general on the stock market's ups and downs, could also display the day's or week's performance of an individual's own portfolio (provided one's stock holdings have already been entered into the computer according to the prescribed format).

Oppedahl wondered how this system would compare with the new children's toys that react to broadcast impulses. "How does the program provider know," he asked, "whether you've pushed button one, two, or three?"

"He doesn't," Harvey replied. "In the simple 'button one, two or three' kind of case, all he needs to do is transmit three alternative selections. He doesn't need to know which one you see. And in cases

where your computer computes, he doesn't need to know your data either. All he needs to know is the format of your data. Given the format, he can write software that will cause your computer to compute your information. From our point of view, this means that personalized television has privacy benefits that we believe many people will find quite valuable."

"Will your system," Oppedahl continued, "permit printing out—after a Crest commercial, for instance—a cents-off coupon?"

"Yes," Harvey answered, "and personalized TV will enhance the value of the time that broadcasters sell to advertisers in other significant ways. In fact, we believe that the benefits for advertisers will be very important to the system's success."

Speaking as a patent attorney, Oppedahl observed that the fair-use doctrine will allow other inventors to assemble and operate such systems in their laboratories in order to develop and patent their own more advanced technologies.

"I think the question is, 'How do we cooperate with others?'" Harvey replied. He explained that his firm's objective has never been to form a monopoly. "We see ourselves as developing a new industry in which many people and companies will make handsome profits, and we want to encourage as much useful development by others as possible. At the same time, standards must exist for personalized TV. We feel comfortable that anyone who reads our patents will see that they put us in a position to set the standards not only for the hardware, but also for the software and the data base formats."

"For all the civic motives you mentioned [such as those involving economic planning and the management of finance]," Lippincott suggested, "this could be a great marketing medium. How do you expect to launch it?"

"We will follow a careful 'niche by niche' strategy," Harvey responded. "Considering that our focus, here today, is on technology in homes, I hope you won't mind my saying that we expect to get into homes by launching personalized TV in business communications first and doing what marketers call 'a careful rollout.'" As an example, Harvey explained that a brokerage firm could use the system to communicate research, portfolio strategies, and buy/sell ideas to its brokers over a satellite hook-up, extend the in-house network to include institutional clients, then expand its focus to include high-value retail accounts who would view this financial programming in their homes. "Whatever industries they're in, the learning-curve and market-share implications for the first firms that get into personalized TV communications will be significant," said Harvey.

"I love this idea," Arlen confessed, "especially the potential for customizing the audio. Several existing shows or services—like the Financial News Network—are already pursuing ways to tie text transmitted on the vertical blanking interval into the general audio-and-video presentation. CBS' *Nightwatch* had a tie-in with CompuServe so that personal-computer users could 'talk' with each other in parallel with the broadcast." Similarly, according to Lippincott, the French Minitel system gives viewers of almost every television program a channel for responses, which are sometimes monitored and incorporated back into the broadcasts proper.

Harvey's proposed system would differ from these other examples in thoroughly integrating the options for personalized information into the design and signal of the broadcast program itself.

"I see personalized television as very empowering," observed Antonia Stone. "Think of someone who doesn't have enough money to own stocks but works in an office where other people talk about their portfolios. How does he feel? Out of it? With personalized TV he can have a portfolio. He may not buy or sell his stocks. But he picks them, and he puts them into his computer, and they're his. Then his television tells him he's worth something. It tells him how *his* portfolio performs. Now he *can* talk about his portfolio. He can feel like an active part of something big. And maybe he's learning in the process."

"This idea," Fisher stated, "deals with our broadest question in a most specific way. Our issue should be how to make information widely available and give individuals the power to manipulate it. We won't achieve that by waiting for the Yuppies' personal computers to seep through society. We need to harness broadcasting, which already reaches everyone, as we could harness it if we used broadcast channels to publish books in data form. If we, as a society, launched such a public service, the manufacturers would rise to the opportunity of producing and selling the terminals necessary to receive a broadcast data flow. The *strongest* solution to our knowledge needs will be a *general* solution."

"'Reading' and 'watching' are converging in today's media," agreed Glen Hoptman of the Smithsonian. "But we won't have true interactivity until television itself is digitalized."

"We're in favor of digital television," interjected Harvey. "And we would love to launch personalized TV in a high-definition television environment. Combining it with other advances could prove quite powerful. But we do see compatibility with the NTSC standard as an important consideration."

"'Processing power applied to media'—that's clearly the theme," Heyer declared, "behind personalized television and, indeed, our whole discussion."

DEMO AND CASE-STUDY REVIEWS

One roundtable session of the conference was devoted to reviewing the various electronic-information products, prototypes, or services that were demonstrated on site. Each participant had been assigned to report back to the group on a different "demo"—its pluses and minuses. The aim was not rigorous product testing, but instead a sampling exercise that would help to reveal and characterize some of the many paths to further development of these systems.

Raleigh Roark, Director of Research in the CD-ROM Division of Microsoft Corporation, was excited by "Palenque," an interactive-video prototype program created by Kathleen Wilson and her colleagues at the Bank Street College of Education. The name refers to the Mayan archaeological site in Mexico. In this system, using a joystick control to manipulate the image on the screen, one can seemingly move in any direction all over the site—a simulated exploration of three-dimensional space known as "surrogate travel."

"This was exciting," said Roark, "because it actually does what elsewhere is only a 'might be.' The control you have of your own movement through the pictured space is so special you have to *do* it to *know* it. It also adds new dimensions—audio, full-motion video, and more—to the familiar sort of computer maze game. And it shows the value of a highly-detailed, fully-realized demo. You can get involved in the actual content, not just the concept of the thing. 'Palenque' is a seminal prototype that will spawn a hundred products."

Reacting to James MacGowan's demonstration of an English-language videotex service fed by transatlantic links from the French Minitel system, Mark Heyer found that "the 'chat' function [which permits strangers with common interests to find and communicate with each other] is what stood out for me. When it comes to watching online graphic displays take shape, however, I'm incessantly bored. In the Startext system, by contrast, there are no graphics to speak of, just text, but there the information seemed to appear on the screen very fast and held my interest."

Also commenting on Startext, Lee Hall of the Academy for Educational Development confessed, "I fell in love with it. It's somewhere between Buck Rogers and Will Rogers. The originators of the system seem very sensitive to the users. You can put up to a hundred free messages per month into its electronic mail service. You can take part in open consumer forums; fifty percent of the services grew out of user requests. This is an approach that could be franchised, I think, to other communities."

"The value of Minitel for us," said Harvey Poppel, "is that it has shown that publicly available database networks *can* gain wide, fast acceptance. It's also shown the virtue of a relatively low-tech

approach to achieving this. On the other hand, the social context in France is so different from ours. The electronic media there are generally much less developed than in the U.S. The French are not accustomed to using the phone as we do, at flat-rate cost, just for social conversation. So, when Minitel arrived on the scene, it stirred interests and met needs that were not previously being served."

Several participants commented on Raleigh Roark's demonstration of Microsoft's CD-ROM electronic reference works. Said Frank Fisher: "I'm a nut on reference books, and I think the direction shown by these first electronic versions is good. I'll have to get a system myself as soon as the OED [Oxford English Dictionary] is on CD-ROM."

Lee Hall found the CD-ROM "a beguiling tool—though I'm not sure I'd switch back and forth between different instruments in order to do my research." Roark showed how Microsoft is trying to answer this concern by combining software applications—for example, word-processing with an electronic thesaurus—in the same package.

Lloyd Morrisett felt the need for a "help" box—a function that would ask, "Are you having trouble?" and then guide the user to his intended information quarry.

Mark Heyer had demonstrated a special approach to videodisc program production. Most participants had been familiar with the videodisc as a purely playback technology, much like LP records. That is, ordinary consumers cannot record their own material on such discs; they can only buy copies duplicated from a master disc, which itself typically requires highly specialized skills and equipment to produce. But Heyer showed how, as an interactive-video producer, he can now use a "direct-record" videodisc system, permitting him to assemble at least a "rough cut" of a new program on his own—before having to go to a more elaborate, more expensive process for the final production.

"The direct-record, 'write-once' videodisc is a transitional technology," observed Jeffrey Sarnoff, "but, in essence, it already shows the potential of a real-time, random-access device for capturing and combining a wide range of sights and sounds. There's a natural attraction to it, appealing to our 'show-me, let-me' impulses, making it possible for creative expression in this 'video cockpit' to occur easily."

"It's not meant for consumers," added Glen Hoptman, "but it shows—or at least stirs our thoughts about—the need for *erasable* (as well as recordable) videodiscs, if the public is ever to embrace this technology. At present, the direct-record videodisc is an interim tool for program designers."

Everyone in the group had tried to play the several computer games that were set up at the conference: "Where in the World Is Carmen Sandiego?"; "Beyond Zork"; "Puppy Love"; "Bureauc-

racy"; and "Rocky's Boots." Carl Oppedahl admitted, "I couldn't teach the dog in 'Puppy Love' even the simplest tricks, but I blame myself, not the game. I think that computer games *could* trick people into thinking in new ways, and that's enticing. 'Palenque' will surely trigger the development of a whole raft of surrogate-travel games. With advances in computer processing power, these games, more and more, will offer what once would have cost you millions of dollars to experience."

"Trying to play these games with other people around demonstrated that it's important to have privacy while learning how to use the software," said Gary Arlen. "You can't just sit down cold at the computer. You have to read the game instruction book first, and you have to allow trial-and-error time for making a fool of yourself. That's hard when someone is looking over your shoulder. I found 'Puppy Love' cute but boring; it took so long to figure out the interface. 'Beyond Zork' did not prove to be civilization's great hope for interactive fiction; as the player, I couldn't really help create the story. On the other hand, 'Where in the World Is Carmen Sandiego?' is fascinating. It might be possible to exhaust the information, but it was the most appealing game, especially because it called on and tested the knowledge you brought to it, as well as teaching you facts you didn't know." [Arlen was so fascinated by 'Carmen Sandiego' that immediately upon his return home from Wye, he bought a copy of the game, which he and his family use—and learn from—regularly.]

"Maybe in time we shall all share the basic skills for computer game playing—like the skills for reading a book—and we'll be able to sit down to a computer and play a game right off," Oppedahl commented. "I *was* able to do that with 'Rocky's Boots.'" Richard Adler agreed that "Rocky's Boots" included on the screen from the start everything one needed to know in order to play.

"Remember," cautioned Bernard Luskin, "the computer was created to serve as a business machine. If it's going to be used in the home as well, it's got to be a socializing device. At the same time, it should be recognized that all interfaces are based on stimulus-response models, tapping your natural instincts for control. It's people's underlying wish to behave in an active, controlling way that is supporting the resurgence in electronic game sales."

"All the games," hypothesized Rob Lippincott, "are part of a meta-game, namely, the game that asks, 'Are you experienced? Can you figure me out?' But both the games and these other systems leave me frustrated in regard to design issues. When I compare the aesthetic experience of listening to the live piano-and-string trio who played for us last night with that, say, of looking at the Minitel screen, I'm depressed to admit that the latter is a 'mini' experience indeed. Perhaps the technology as thus far developed can't support anything more than mini-expectations."

"Don't fudge the distinction," Frank Fisher warned, "between intellectual engagement (listening to the trio) and actual learning (how to play the violin). When we accomplish the first effect, we haven't necessarily delivered on the second. I believe we should be most interested in leaving the viewer or user of these systems *altered* in some way."

Ted Voss declared, "I'm a convert to HyperCard. It puts capabilities into my hands I didn't think I could exercise. It's a breakthrough—like being able to say, 'For the first time I can sit down to play the piano and people won't laugh.'"

"I'm struck," said Harvey Poppel, "by how much creative and design effort has to go into even simple software products, and you can't spread those costs over a mass market as you can television production costs. This means the industry has to unify around what consumers will buy. We also need content engines that can be applied to different subject categories. 'Where in the World Is Carmen Sandiego?', for example, could be taken as a structural model for a game format to learn other things besides geography."

"I'm concerned," replied Lippincott, "not that we're spending too much on these developments, but that we're not spending enough. It takes $1.4 million to produce a single episode of *Miami Vice*, whereas really important stuff has to be done on peanuts. To be sure, HyperCard will now permit all sorts of people to stay up all night devising new programs, but for any accomplishment of deep importance, money has to be found, too."

"I agree," said Steve Gano, a software and interactive-video designer, "that all we've proved thus far—for example, in the prototypes combining videodiscs with HyperCard 'stacks'—is technical competence. That was and is our intention: to show how these tools can grant accessibility to this technical competence to someone like Frank Fisher and the Perseus Project, so *they* in turn can create the substantive program applications that will have lasting consequence."

"It's true," added Glen Hoptman, "that the institutions now generating the most influential interactive-video prototypes (such as 'Palenque') work from rich educational traditions (Bank Street College of Education)."

"If we're supposed to be looking at ways of doing things in the home that we've not been able to do before," said Antonia Stone, "I think of a software success like 'Flight Simulator,' which, just as its name implies, does give you the experience of piloting an airplane in your own living room. That was the appeal, too, of the interactive NOVA program we saw: 'Gee,' it made me think, 'I could be a bee!'"

"Can you call 'Flight Simulator' a success?" asked Bernard Luskin. "It's like the tree falling in the forest that no one hears. You can't build a large-scale impact by inching forward on the backs of technophiles. You have to standardize and establish a new medium in the home and simultaneously, in parallel, in the schools."

"I don't know of any plans," Voss said, "to make either in-school or home products with 'Palenque'-like presentation techniques. What would it take? How can we get these products into the hands of educators so that their interest might help elicit new consumer-oriented offerings too?"

Hoptman cited initiatives in Congress and at the state level to aid schools in buying computer hardware. "But where," he asked, "is there any support for the costs of developing the new software?"

Thus it was that the several on-site demonstrations reinforced ambitions for a new and more effective generation of electronic information products and services—and, at the same time, underscored the current paucity of investment in the research and development that will have to occur before these media can reach a takeoff stage in either the institutional or consumer markets.

TOWARD ADOPTION OF COMPUTER TECHNOLOGY IN THE HOME

"I'm a software designer," Steve Gano stated, "so I'm like the fellow who has only a hammer: everything else comes to look like a nail." That was the explanation for his concentration on design issues in the paper he prepared especially for this conference: "A Draft of a Request for Proposals Concerning the Adoption of Computer Technology in the Home."

Gano's assignment had been to imagine that he was a foundation or venture capitalist with substantial funds to invest in model projects. In that role, he was to write a formal "RFP" (or "Request for Proposals") that would specify the key elements for "exemplary prototypes . . . intended to serve three purposes: to help articulate design issues about the utility and useability of computer and media technologies in the home; to help reduce the unknowns and risks involved in commercial development of home computer products and services; and to stimulate discussion, excitement, and possibly demand for these technologies among industry and the general public."

The design issues he had in mind can be identified across a broad range. At the hardware end, for example, there is the question of interface between machine and user. The keyboard that is familiar to office and professional settings is generally foreign to the home. What might be a more accustomed way for, say, interacting with the technology from across the room? Is the television remote control,

which lets one change channels without leaving the sofa, a more likely candidate for the ideal home-technology interface than the keyboard? What are the other choices? At the other end of the spectrum are the psychological issues. As compared with the task orientations of business users, will home users expect far more immediate and personal gratifications—an entertaining or stimulating experience as opposed to getting a job done?

Gano reminded the group of issues that had emerged from previous sessions in this very conference:

— How to proceed from technical invention to social innovation?

— When to rely on large-scale efforts to involve people with new technology (automatic teller machines), and when on grass-roots initiatives ("the hobbyist sub-culture")?

— What are the social innovations that market forces produce? What significance should we place, for instance, on Startext's use by the handicapped—"an unpredictable marginal extension of a commercial service"?

— Will only an elite, or a set of elites, benefit from these advances? What would have to happen to change that?

— If potential users find it hard to imagine how they would use a new technology without giving it a try, how should we go about organizing such "tries"?

"Let's fund a variety of research projects," Gano recommended, "that will (1) demonstrate clear benefits to current non-users; (2) place prototypes in the hands of representative potential users; and (3) publicize the results."

"Some things like messaging," commented Carl Oppedahl, "will work only if lots of people are involved in the test. You won't use it if there aren't other individuals you want to exchange messages with in the same system."

"For stand-alone systems," said Mark Heyer, "the tough thing is coming up with the programs."

"There's always a big difference," Kathy Wilson pointed out, "between an information *service* [where the content offered is the principal value] and an information *tool*, including simulations [where the user's ability to manipulate the information is the prime attraction]." The proposed prototypes, she implied, should be clear about which they are and, therefore, which particular virtues they are putting to the test. (Coming from the creator of "Palenque," which had been judged by the group to display out-

standing features *both* as a source of content *and* as a tool for user interaction, this advice could not be taken to mean that software prototype designers were condemned to either-or choices, only that they must be explicit about their aims.)

"The biggest limitation of Gano's scheme," said Frank Fisher, "is that it assumes we shall be working only on the edges of what's known and available now, whereas the major strides may require new approaches we can't even guess at today."

"What is our real goal in this?" queried Rob Lippincott, "—to share successes? to get ready for the coming of, say, Minitel? or to investigate the art and philosophy of interactivity?"

"If our aim is to get to the non-users," Ted Voss said, "we have to identify and characterize the existing barriers. Is it too hard to get started? Is there no perception of the value in the technology—of what benefits *are* in store? That's hard to know ahead of time. I'm reminded that Startext's value has grown out of what its users have given back to it."

"We have to look at people's *emotional* needs," said Antonia Stone, "and present them with answers. Phones and videotex, for example, can be answers to a sense of personal isolation. Television is often a case of dream fulfillment. Computer games may respond to people's need to feel control over part—even an imaginary part—of their world."

"You can't really test product acceptance," warned Gary Arlen, "without testing price."

"It's crucial to know what constitutes a valid test," added Raleigh Roark. "The weak point in so many experiments is the vested interest its originators naturally have in finding success. Still, it's very important to build *lots* of prototypes—you can't predict which of them will pass muster."

"Yes," agreed Kathy Wilson, "learning by doing is the only way. I wish there had been five other projects like 'Palenque' underway at the same time, so we could have compared our work."

"If we were to fund prototype projects like those Steve Gano has called for," Lloyd Morrisett asked, "to whom would we send copies of the RFP?"

Harvey Poppel suggested sending them to "independent research firms—that is, independent of both hardware and content interests—whether profit or non-profit, or some sort of catalytic organization that would assemble a consortium of partners."

John Harvey proposed advertising in *The Economist* or the Science Section of *The New York Times* and "see who comes forward."

Glen Hoptman recommended working with combinations of top institutions—"'X' university, 'Y' museum, and 'Z' hardware maker."

How important, the group was asked, is the individual expert or creative person in this sort of project?

"It's hard," Wilson replied, "for content experts to know what the programmers or the hardware can do, but every project needs one core person who can stage the progress of work involving everyone else."

Then shouldn't the RFPs be sent to the individuals who show the greatest promise as project or team leaders?

"Depending on what sort of support you're offering in the first place," said Rob Lippincott, "you might find that only big organizations, willing to gamble their overhead in the time and effort it takes to write a proposal, will be able to respond."

"Then use a two-stage funding approach," advised Poppel, "funding even the writing of the initial proposal on the basis of an individual's track record or brief statement of interest. Then, of the proposals received, go on to fund at a higher level only the ones that seem best."

"I like the notion of a prize," Lippincott added, "that would be given for the best 'idea paper,' and then the prize could be used to meet the expense of developing the full proposal."

"You could use the typical non-democratic approach of the corporate world," Ted Voss allowed. "That is, identify several groups whose work interests you, fund all of them but only them through the proposal stage, and finally go forward to the full-prototype stage with only the one or two who convince you they have something exciting to offer."

How would a typical prototype project team be constituted? The group offered several formulae, but all tending to specify the following basic membership: (a) a designer of the interactive program experience, who might also be the software programmer but in any case someone who would head up the whole effort much as a producer does for a television program; (b) a producer, or producer-director, of the video elements—full-motion footage, graphics, etc.; (c) the software programmer (if separate from the team leader); (d) the content expert; (e) an expert in formative research; and (f) the hardware supplier.

Heyer cautioned, "It can be enormously inefficient to assemble such a team for just one project at a time. They should have several developments going at once if they're to make the most of their talents and efforts."

"The team leader," Roark declared, "has to have a global vision and the ability to reconcile warring perspectives."

Gano's approach, said the moderator, is most concerned with formal (or design) aspects of interactive media for the home. What if, in addition or instead, there was an approach guided by a concern for a particular subject area (like the Perseus Project's commitment to ancient Greece) or for a particular user group (like the elderly)? Wouldn't a *content*-driven research-and-development project, given its personnel's passionate interest in the subject matter, produce some of the most exciting *formal* innovations as well?

"No single metaphor works for everything," Luskin observed.

"Yes," the moderator went on, "but I bet there will turn out to be just a handful of standard formats in these new media, just as there are in television. The big differences, then, will arise from the content, not the form."

"With television," Lippincott commented, "you consume content in a very conventional form. It's like being at the end of a funnel. But interactivity creates a wide range of variables at the receiver-user end. I think we have to develop a curriculum for educating the authors in this new medium."

Kathy Wilson admitted, "It was a great help to 'Palenque' that we had to observe certain constraints, such as the age range of its target users, the choice of subject, the particular technology, and so on. A project runs more smoothly and can narrow in faster on what has to be done, the more you decide these things at the start."

"What about the non-users we want to seduce into becoming users?" asked Voss. "The virtue of the 'Palenque' and 'Perseus' demos was that their technical barriers disappeared, letting the content attract and hold us. What research or development do we need to lower those barriers for everyone—for a broad market, not just an elite?"

"Let's not settle for something cheap," Lippincott said. "Let's postpone worrying about the mass market, and just concentrate on creating things that are genuinely good."

"Or, let's convene a *junior* Aspen Institute conference, made up of kids," Arlen proposed, "and listen to what they find—and would like to see—in these new media."

The actions taken to follow up these proposals and suggestions will be the subjects of future reports in this series.

PARTICIPANTS

Richard Adler, Director, Teleservices Program, Institute for the Future, Menlo Park, CA

Gary Arlen, President and Publisher, Arlen Communications, Bethesda, MD

Walter S. Baer, Director of Advanced Technology, Times-Mirror Co., Los Angeles, CA

Gerry J. Barker, Manager, Startext, Fort Worth, TX

Paul Bishop, Director of Computing, Washington College, Chestertown, MD

Edith Bjornson, Program Officer, The John and Mary R. Markle Foundation, New York, NY

Francis Dummer Fisher, Consultant, Perseus Project, Harvard University, Cambridge, MA

Steven Gano, Consultant, San Francisco, CA

Lee Hall, Senior Vice President and Director, Division of Arts and Communications, Academy for Educational Development, New York, NY

John C. Harvey, Partner, Harvey, Keil & Parker, New York, NY

Mark Heyer, President, Mark Heyer Associates, Inc., Palo Alto, CA

Glen H. Hoptman, Editor-in-Chief, Optical Publishing, Smithsonian Institution, Washington, DC

John Jay Iselin, Consultant, Twentieth Century Fund, New York, NY

Robert M. Lippincott, Market Development Director, Lotus Development Corporation, Cambridge, MA

Bernard J. Luskin, President, American Interactive Media, Inc., Los Angeles, CA

James McGowan, Director, U.S. Division, CTL Communications, Inc., New York, NY

Lloyd N. Morrisett, President, The John and Mary R. Markle Foundation, New York, NY

Carl Oppedahl, Attorney, Brumbaugh, Graves, Donohue & Raymond, New York, NY

Harvey L. Poppel, Partner, Broadview Associates, Fort Lee, NJ

Michael Rice, Director, Program on Communications and Society, and President, Michael Rice Media, Inc., New York, NY

Raleigh M. Roark, Director of Research, CD ROM Division, Microsoft Corp., Redmond, WA

Jeffrey Sarnoff, President, Carnara & Associates, Ivy, VA

Antonia Stone, Executive Director, Playing to Win, Inc., New York, NY

Theodore N. Voss, Consultant, New York, NY

Gerald E. Waterson, Associate Dean of Applied Studies, Chesapeake College, Wye Mills, MD

Kathleen S. Wilson, Palenque Project Director, Bank Street College of Education, New York, NY

AUDITOR

Robert J. Donovan, Graduate Student, Education, Hunter College, New York, NY

PROBING THE POTENTIAL OF ELECTRONIC PUBLISHING AND COMPUTER SOFTWARE FOR PERSONAL USE

Form to Order Papers

TO: Stephenie Ralston
The Aspen Institute
235 N. Central Avenue
Ramsey, NJ 07446

FR: Name _____

Position _____

Organization _____

Address _____

_____ ZIP _____

Phone (____) _____

Please send me, at no charge, a single copy of each paper checked below:

☐ Richard Adler, "Technologies for Electronic Publishing and Computer Software: An Essay on Technical Invention and Social Innovation," Aspen Institute, 1988.

☐ Gary Arlen, "Getting It Online: Prospects for Developing a Consumer-Oriented Home Information and Transaction System," Aspen Institute, 1988.

☐ Steve Gano, "A Draft of a Request for Proposals Concerning the Adoption of Computer Technology in the Home," Aspen Institute, 1988.

Relevant back issues of the Communications and Society FORUM REPORT:

☐ Michael Rice, "Toward Enhancing the Social Benefits of Electronic Publishing," Communications and Society FORUM REPORT #1, Aspen Institute, Report of the Planning Meeting, February 25-26, 1987.

☐ Michael Rice, "Toward Improved Computer Software for Education and Entertainment in the Home," Communications and Society FORUM REPORT #3, Aspen Institute, Report of the Planning Meeting, June 3-4, 1987.